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Natural Resources
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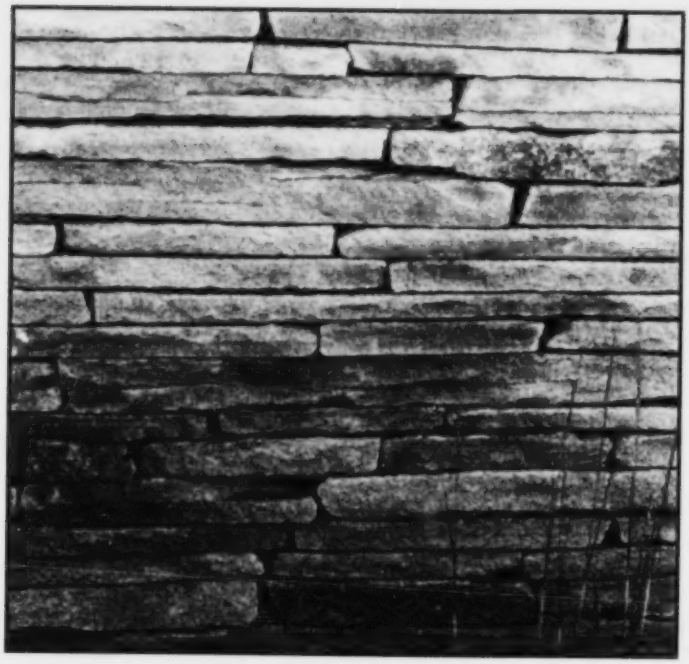
SURVEY OF POTENTIAL FLAGSTONE RESOURCES IN CENTRAL AND EAST-CENTRAL NEW BRUNSWICK



T.C. Webb

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Survey of Potential Flagstone Resources in
Central and East-Central New Brunswick

Cover illustration: Locally quarried, planar, very thin bedded, medium-grained sandstone used in a small retaining wall near Coles Island, Queens County (NTS 21 H/13), in south-central New Brunswick.

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Department of Natural Resources
Province of New Brunswick

Hon. Keith Ashfield
Minister of Natural Resources

February 2006

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106-04690/

ABSTRACT

New Brunswick's diverse geology is seen as a considerable asset given expanding interest in the use of natural stone resources for landscaping and a host of related applications. One type of material contributing to this developing market trend is flat or nearly flat stone, commonly referred to as flagstone. In New Brunswick flagstone resources are commonly associated but not restricted to Upper Carboniferous, bedded sedimentary clastic rocks underlying an extensive triangular shaped area extending southeastward from Miscou Island in northeastern New Brunswick to Oromocto Lake in the southwest and eastward to Cape Tormentine. The large size of this prospective area and potential availability of suitable flagstone materials for development purposes has instigated a selective reconnaissance survey focused on the central and east-central parts of the Province, an area characterized by favourable geology for these types of materials and extensive tracts of Crown land. Preliminary results in this part of New Brunswick has revealed almost 30 sites spread out over eight 1:50 000-scale NTS map sheets, potentially suited for a wide range of flagstone end products.

RÉSUMÉ

La géologie diversifiée du Nouveau-Brunswick est considérée comme un immense atout, compte tenu de l'intérêt grandissant à l'égard de l'utilisation des ressources de pierre naturelle pour l'aménagement paysager et toute une série d'utilisations connexes. Un type de matériau contribuant à cette tendance d'expansion du marché est la pierre plate ou quasi plate, communément appelée « dalle ». Les ressources de dalles du Nouveau-Brunswick sont généralement associées, sans toutefois s'y limiter, aux roches clastiques sédimentaires litées du Carbonifère supérieur constituant l'assise d'un vaste secteur triangulaire qui s'étend de l'île Miscou, dans le Nord-Est du Nouveau-Brunswick, jusqu'au lac Oromocto dans le Sud-Est, en direction sud-est, et jusqu'à Cap-Tourmentin, vers l'est. La vaste superficie de ce secteur prometteur et l'accessibilité éventuelle de matériaux de dalles qui conviennent à des fins d'aménagement a engendré l'exécution d'un levé de reconnaissance sélectif centré sur les parties du centre et du centre-est de la province, une région caractérisée par une géologie favorable à ces types de matériaux ainsi que par la présence de parcelles étendues de terres de la Couronne. Les résultats préliminaires des travaux dans cette région du Nouveau-Brunswick ont révélé presque 30 emplacements s'étalant sur huit feuilles cartographiques du SNRC à l'échelle de 1/50 000 de roches qui pourraient convenir à un vaste éventail de produits finals à base de dalles.

SURVEY OF POTENTIAL FLAGSTONE RESOURCES IN CENTRAL AND EAST-CENTRAL NEW BRUNSWICK

INTRODUCTION

The natural stone materials used in landscaping and related accent applications in residential and commercial construction continue to gain popularity throughout North America. Although the reasons driving this trend are many, reasonable unit costs, local availability, unique design possibilities that fit natural environments, and the ease of working with a chosen material without the need for expensive equipment are among major contributors. Changes in lifestyle, where preferences are being shown in creating niche areas of solitude and relaxation, are also seen as contributing factors.

Primary uses of these materials are limited only by one's imagination. Common exterior applications are for facing material and for landscape design. For landscaping, it finds appropriate use and function in freestanding and retaining walls, in pathways and water features, in patios, stepping stones, stair treads, and as special gardening accents. Typical interior uses include flooring, fireplaces, and accent borders.

Here, the term natural stone is defined as rock typically extracted from surface pits or quarries, requiring no to very limited processing on its way to an appealing, marketable product. One of the natural stone materials commonly relied on for these and other unique applications is flagstone, a general term referring to irregularly shaped, variously sized rock fractured or cleft into flat or nearly flat slabs 2-5 cm thick (Figure 1).

Although it can be sourced from many different textural rock types, flagstone material is mostly derived from naturally stratified deposits of slate, limestone, and sandstone. Flagstone is versatile and is used in both interior and exterior applications. It is generally marketed in two forms (Figure 2a and b) and in varying thicknesses 1) irregular flagstone, which is a randomly shaped stone, or 2) patterned flagstone, which is split along original bedding planes and cut into squares or rectangles of varying sizes.

Production and marketing of flagstone in New Brunswick is currently limited to only a few operations. Most are small, occasionally operated enterprises, producing limited amounts of rough random sized material generally on a demand basis to local landscaping enthusiasts. One notable exception is a relatively new company, Brunswick Limestone, established near the village of Hillsborough, about 25 km south of the City of Moncton in southeastern New Brunswick. Brunswick produces a wide range of random shaped and cut product including ashlar and flagstone of variable size and thickness from evenly laminated limestones of the Lower Carboniferous Macumber Formation (Figure 2a and 2b). Generally available in three colour combinations, grey to green to red, Brunswick markets material throughout eastern Canada, parts of United States, and to offshore destinations.

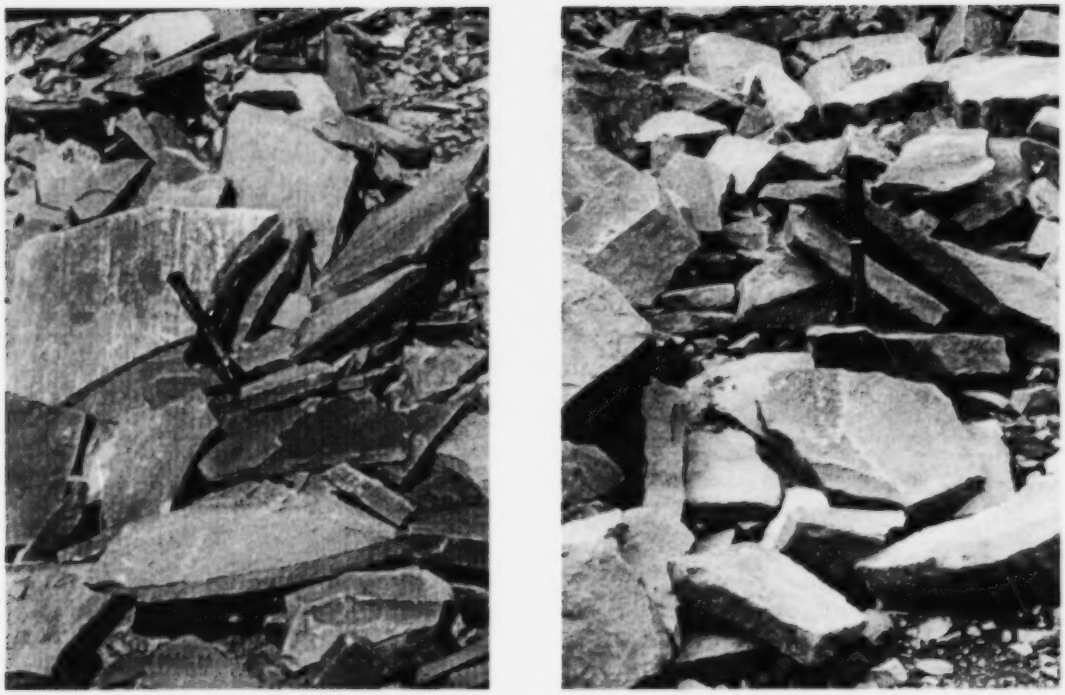


Figure 1. Typical flagstone: irregularly shaped, very flat, evenly bedded, medium-grained sandstone on the left (NTS 21 J/08); irregularly shaped, planar to lenticular bedded, medium-grained sandstone on the right (21 I/06).

Two thirds of New Brunswick's land area is characterized by extensive tracts of stratified sedimentary clastic rock including widespread bedded sandstone resources that locally may be worthy of further consideration for potential flagstone development opportunities. Up until recently, attempts to quantify and qualify these resources in light of growing domestic and regional demand have been relatively limited. This report is intended to generate interest in potentially marketable flagstone opportunities in New Brunswick. It should serve as a starting point to a realistic development alternative and contribute to the diverse nature of New Brunswick's mineral industry.

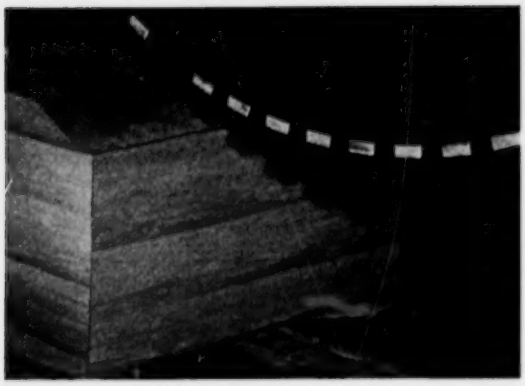
SCOPE

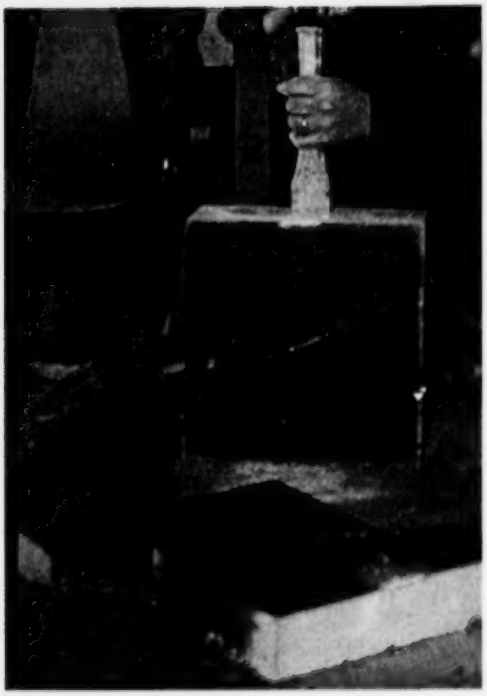
Apart from locating suitable materials capable of being excavated, processed, and marketed effectively, successful development of natural stone resources anywhere relies heavily on the procurement of land. Reasonable access and the availability of potential development sites play a major role in minimizing primary raw material cost(s), a critical component when considering the feasibility of this type of resource development initiative. To lessen the impact of resource allocation and other related development issues, it was decided to restrict the present investigation to potentially favorable materials occurring primarily on Crown lands. Development concerns are minimized in most cases as Crown lands are relatively remote from areas of potential land use conflict. Depending on circumstances, it is possible to acquire a

Figure 2a. Evenly bedded limestone flagstone (Macumber Formation), randomly shaped, sized and split to varying thicknesses along original bedding planes near Hillsborough in southeastern New Brunswick (NTS 21 H/15).

prospective resource(s) through an established regulatory procedure (Appendix B), where special attention is devoted to environmental and related operational matters. Costs of material are considered reasonable, based on a fixed royalty rate, viewed as offsetting the effects of higher transportation costs from relatively remote areas to designated markets or distribution centres.

After correlating favourable geologic setting(s) with the distribution of Crown land resources, an 8000 km^2 area in central and east-central New Brunswick was selected to form the basis of this initial flagstone investigation (Figure 3). Given the size of the study area it was necessary to restrict the nature of the work to a reconnaissance survey of numerous active and inactive pits or quarries where rock was well exposed and could be properly evaluated.





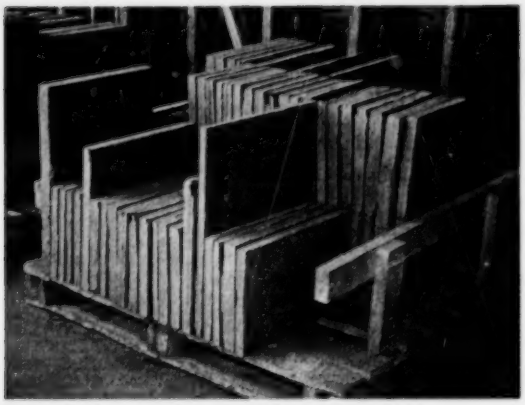


Figure 2b. Evenly bedded, limestone flagstone (Macumber Formation) as displayed in Figure 2a, processed into squares or rectangles of varying sizes and split along original bedding planes to varying thicknesses near Hillsborough in southeastern New Brunswick (NTS 21 H/15).

GEOLOGIC SETTING

Geologically the study area is part of the extensive New Brunswick Platform, one of several Carboniferous subbasinal structures that are part of the larger Maritimes Basin (Department of Natural Resources and Energy, 2000) of Atlantic Canada. Platform rocks in this part of the province are for the most part comprised of a thick Carboniferous age, fluvial sequence of sedimentary clastics referred to as the Pictou Group. Pictou strata are essentially undeformed, dominated by an interbedded sequence of dark red and grey sandstone, shale, and mudstone, with minor arkosic grit, conglomerate, and rarely, thin seams of coal. These rocks have been

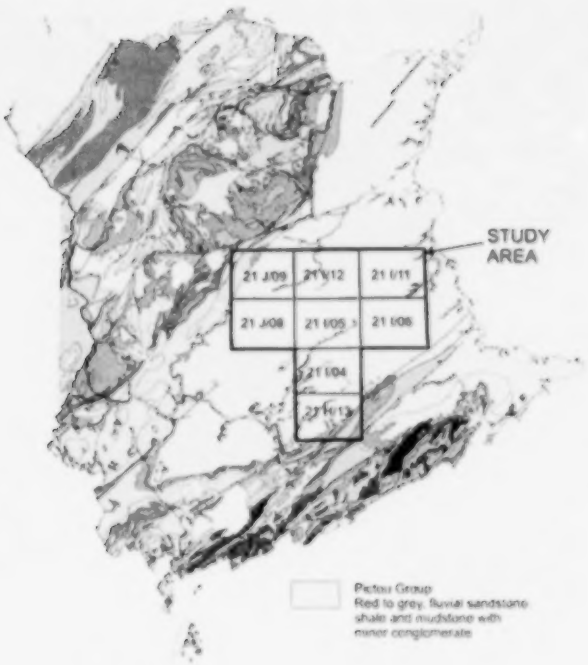


Figure 3. Location of flagstone study area, with 1:50 000-scale NTS map sheet coverage indicated.

deposited primarily by a network of meandering river and related stream channels (Williams et al. 1985), a depositional setting offering reasonable expectations for flagstone resources of variable quality and extent.

GEOLOGIC CONTROLS AFFECTING THE DISTRIBUTION OF FLAGSTONE IN THE STUDY AREA

In the study area the distribution of flagstone reflects different bed forms that develop in response to shifting stream flow conditions in meandering and braided stream channel settings within the fluvial rocks of the Upper Carboniferous, Pictou Group. By observing the various bedding styles it is possible to arrive at some general conclusions as to what one can expect in terms of quality and quantity of flagstone material present at a given location.

Figure 4 is one of several models commonly used to demonstrate the relationship between flow regime and expected bed forms under conditions of steady uniform flow in a typical meandering channel environment. In considering this particular model it is important to understand it represents a complete uninterrupted depositional cycle. Given fluctuating conditions of deposition and erosion in such an environment, a cycle can often be interrupted and restarted many times and at various points throughout the sediment accumulation process.

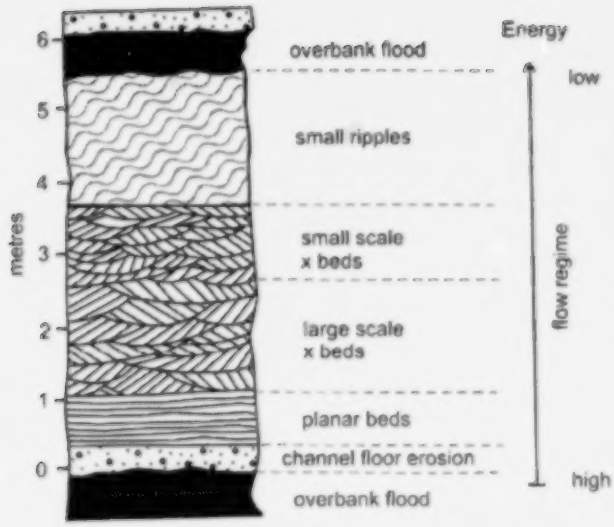


Figure 4. Modified depositional model proposed by Allen (1963), demonstrating the influence of flow regime on bed form in a meandering channel, fluvial setting. Flow regime decreases toward the top of the section.

The coarse base of the proposed depositional sequence represents the highest flow regime and is composed of channel lag conglomerates. These lag deposits are successively overlain by planar bedded and cross-bedded sandstones, and siltstone and mudstone displaying small ripples indicative of the lowest flow regime near the end of the depositional cycle (Figure 4). This proposed model may assist exploration efforts for various types of flagstone resources.

As indicated on the model, planar or evenly bedded sedimentary materials of varying thickness found near the base of the sequence, comprise a relatively small proportion of the complete cycle (Figures 4 and 5). In general it can be expected this strata would seldom exceed a thickness of a few metres and may also be somewhat restricted in its vertical and horizontal extent (i.e., a few hectares or less). The quality of flagstone material is typically excellent characterized by evenly bedded, evenly textured coarse- to medium-grained sandstone, frequently in large slabs, sometimes exceeding a couple of square metres, varying in thickness from 1 to 5 cm.

The overlying, large scale cross-bedded unit will be characterized by a mix of both planar, and unevenly to irregularly bedded material of varying textural contrast and thickness up to several cm (Figures 4 and 6). Large slabs will be an exception rather than the rule with individual flagstone pieces being quite variable in size (i.e., 0.3 - 0.5 m^2) and thickness. Although these deposits lack higher quality planar bedded materials, they often represent relatively large resources of utility (i.e., generally less expensive) flagstone suitable for and even preferred for a wide range of applications.

Near the top of the depositional cycle is small scale, cross-bedded finer grained clastic materials (i.e., siltstone and mudstone). Similar to larger scale cross-bedded sandstone this part of the cycle will offer a mix of irregular and planar bedded flagstone, however, individual pieces will

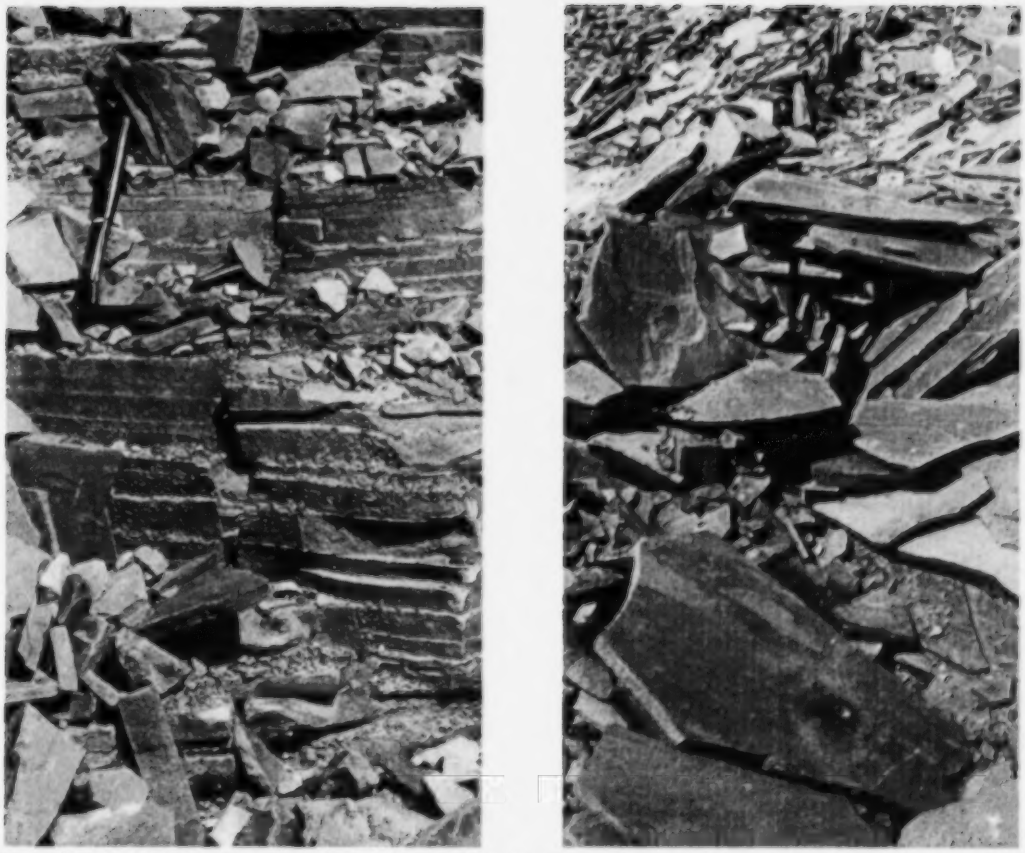


Figure 5. Typical planar, evenly bedded, evenly textured sandstone ("plywood rock"), often comprising of large slabs varying in thickness from 1 to 5 cm, central New Brunswick (NTS 21 J/08).

generally be smaller (i.e., < .03 m^2), very irregular in shape and seldom more than 1-2 cm thick. The size of the resource may be somewhat restricted in terms of its thickness and aerial extent.

SURVEY OF POTENTIAL FLAGSTONE RESOURCES ON SELECTED CROWN LANDS IN CENTRAL AND EAST-CENTRAL NEW BRUNSWICK

Within the central and east-central New Brunswick study area almost thirty potential flagstone resource areas have been identified and catalogued from parts of Kent, Sunbury, Queens, Northumberland, and York counties (Figure 7 and Plate 2004-3 in pocket). These potential resource areas are scattered about eight, 1:50 000-scale NTS map sheets (Figure 8), with over 70% occurring on sheets 21 I/04, 05, 06, and 21 H/13 (the Chipman, Salmon River Road, Harcourt, and Codys map sheets, respectively).

Queens County accounts for the greatest number of potential resource possibilities. Areas south of the Canaan River, between Highways # 10 and # 2; and one east of Cumberland Bay are of particular interest with respect to extensive resources of evenly to irregularly bedded sandstone near surface. A few notable occurrences of very flat, thin- to medium-bedded

Figure 6. Cross-bedded, lenticular and unevenly to evenly bedded sandstone of variable size and thickness, east-central New Brunswick (NTS 21 I/06).

a sandstone occur near the Northumberland-York County boundary south of the Southwest Miramichi River, between Boiestown and Doaktown (Plate 2004-3, in pocket; sites F-19-02 and F-20-02).

Throughout the study area the colour of stone varies slightly from place to place, however it would appear that fresh, unweathered rock at many prospective sites is represented by various shades of grey, with light olive grey and brownish grey among the most common.

A catalogue summarizing information collected for prospective flagstone resources from selected Crown lands in the study area is provided in Appendix A. Included are data related to location, type of exposure, texture, bedding characteristics, colour of stone, and photos of the material where available. Most proposed resource areas are associated with sites of former excavation.

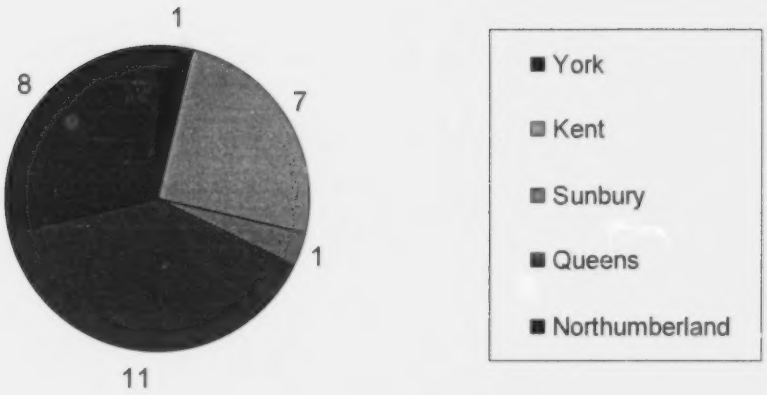


Figure 7. Location and distribution of prospective Crown land flagstone resources in eastern New Brunswick, by number of sample sites per county.

SUMMARY

Despite New Brunswick's geologic diversity, exploration and development pertaining to natural stone for landscaping and a host of related applications is surprisingly limited. The extensive assortment of bedded, coarse- to medium-grained sedimentary clastic rocks of the Carboniferous Pictou Formation that underlie parts of central and east-central New Brunswick frequently contain a wide variety of flat or nearly flat stone, commonly referred to as flagstone. Depending on quality and other factors this material is considered a reasonable development opportunity in light of an expanding domestic and regional demand. A preliminary reconnaissance survey restricted to Crown lands in this part of New Brunswick has revealed almost 30 sites possibly suited for a wide range of flagstone end products. In general most prospective resource areas are dominated by brownish to olive grey, coarse- to medium-

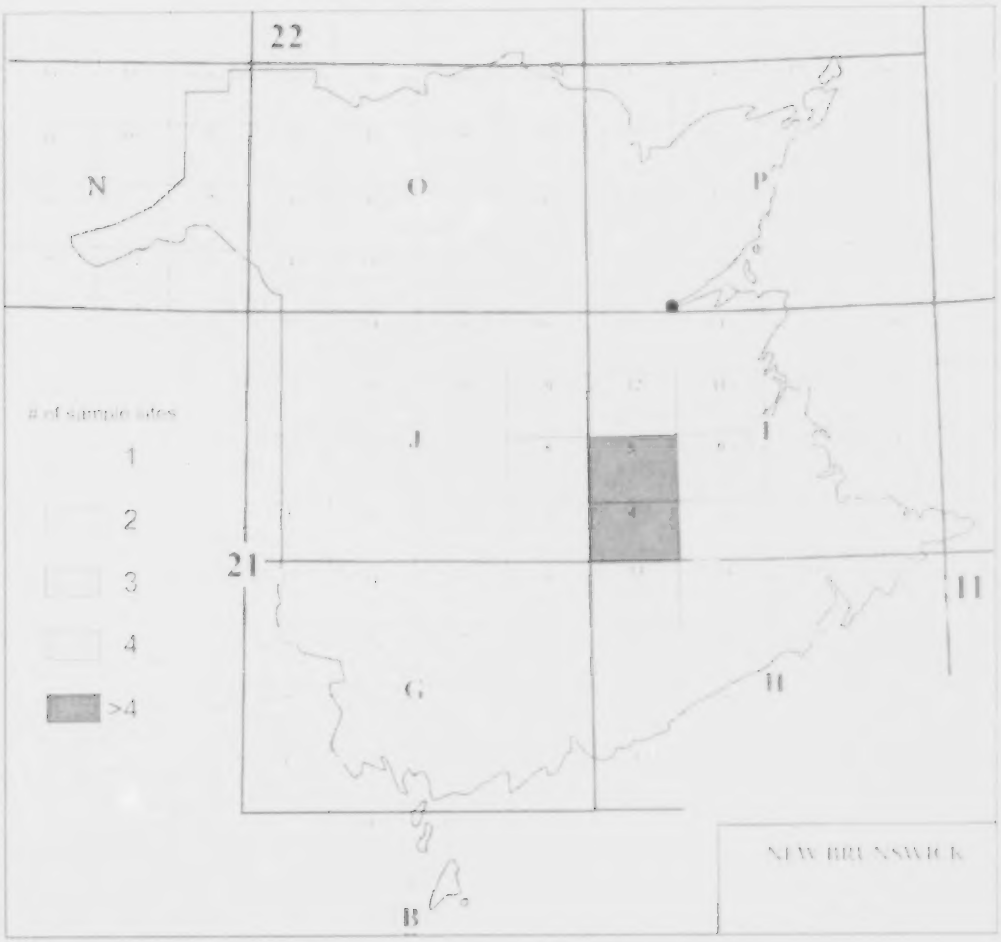
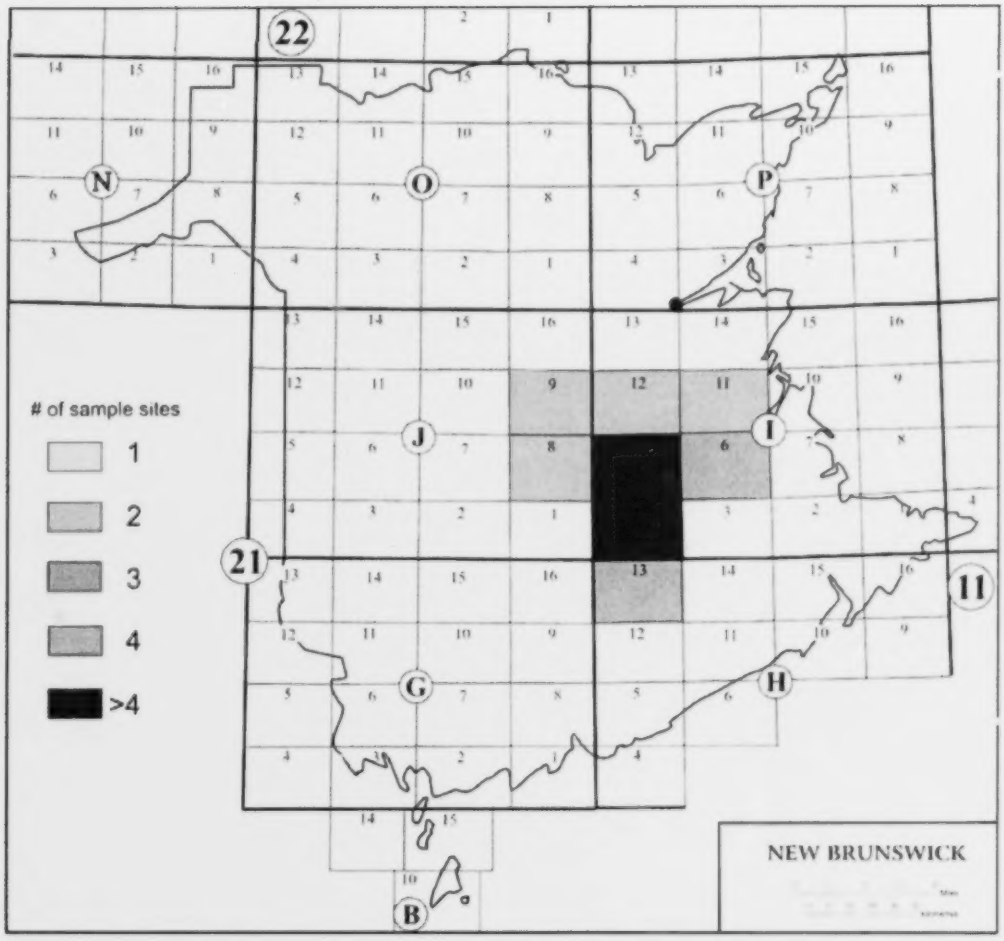


Figure 8. Distribution of prospective Crown land resources of flagstone in eastern New Brunswick, by number of sample sites per 1:50 000-scale NTS map sheet.

grained, large- to medium-scale cross-bedded sandstones offering a mix of flat-planar and unevenly-irregularly bedded material. The resource is usually of sufficient thickness and extent to supply large tonnages of marketable rock in piece sizes usually greater than 0.3 m^2, with limited waste and from relatively small excavations. Areas characterized by finer grained, small scale cross bedded sandstone usually appear capable of providing large tonnages of irregular bedded material although individual pieces tend to be smaller (< 0.3 m^2) and the potential for higher tonnages of waste rock is greater. Prospective sites displaying primarily flat-planar bedded, coarse- to medium-grained sandstone are relatively few. This type of stone is considered a premium, high-quality material. Although the thickness and extent of resource may be limited, individual pieces can exceed 2 m^2. Depending on bedding thickness and the method of extraction, waste to product ratios for this stone can be quite high.



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Although the colour of the stone varies throughout the study area and even within the same excavation, it generally is represented by contrasting shades of grey, with brownish grey and light olive grey among the most popular.

Selected Crown lands in the eastern half of Queens County (1:50 000-scale NTS map sheets 21 I/04 and 21 H/13), and the southern and western part of Northumberland (NTS map sheet 21 J/08) and Kent counties (NTS map sheet 21 I/05) respectively, appear to offer several potential resource possibilities for flagstone of varying quality (Figure 3 and Plate 2004-3 in pocket) in central and east-central New Brunswick.

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APPENDIX A: SITE DATA FOR POTENTIAL FLAGSTONE RESOURCE MATERIALS FROM SELECTED CROWN LANDS IN CENTRAL AND EAST-CENTRAL NEW BRUNSWICK

Note: All geographic coordinates are based on the North American Datum 1983 (see Plate 2004-3 in pocket for locations)

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Site F- # -02	Deposit Name	County	NTS 21	Page #
1	Pangburn Road (A)	Queens	I/04	17
2	Pangburn Road (B)	Queens	I/04	20
3	Pangburn Road (C)	Queens	I/04	22
4	Pangburn Road (D)	Queens	I/04	24
5	Meadow Brook	Queens	I/04	26
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28	Coal Creek (north)	Queens	I/04	72

New Brunswick Crown Land Flagstone Survey

DATE: June 12, 2002

SITE #: Pangburn Road (A) / **F-1-02**

LOCATION:

NTS: 21 I/04 County: Queens

Geographic Description: North and adjacent the Pangburn Road, 10-11 km from its intersection with Highway # 112.

Latitude: 46° 01.842' Longitude: 65° 41.763

UTM Grid Zone: 20 Coordinates: 290900 E 5100500 N

Location wrt waterways (km): ■ < ¼ □ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: ■ Active □ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
□ Sandstone 100%
□ Coarse-grained (0.5 - 2mm)
■ Medium-grained (0.25 - 0.5mm)
□ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even □ Irregular
□ Very Very Thin (<1/2) ■ Even ■ Irregular

Dip: 16° N Strike: 280°

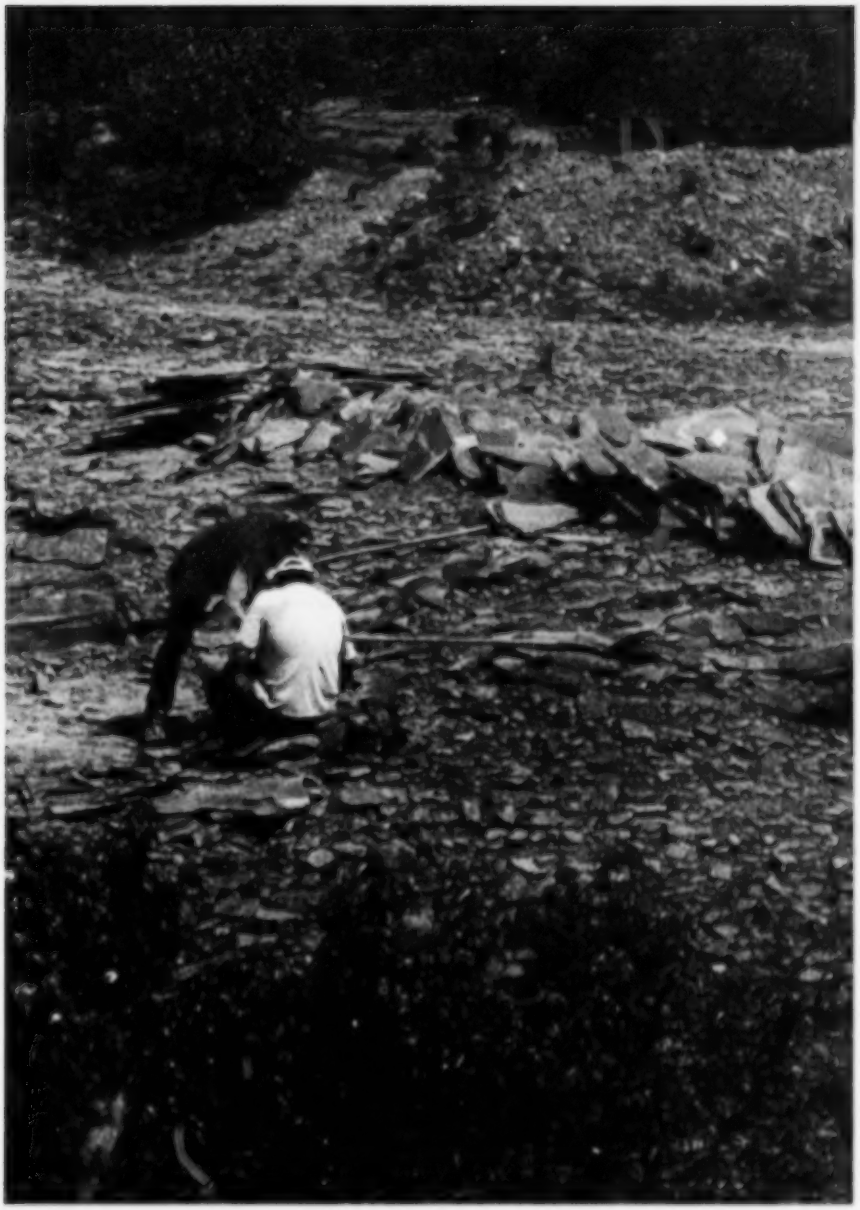
COLOUR: Weathered: Greyish pink Unweathered: Yellow grey

REMARKS: Dip and strike of beds is quite variable. Most beds are irregular (wavy) with black manganese oxide staining locally.

PHOTOS:

Site #: **F-1-02**

Thinly bedded, fine-grained sandstone adjacent the Pangburn Road, northeastern part of Queens County, south-central New Brunswick



Site # **F-1-02**: Plan view of active excavation of thinly bedded, fine-grained sandstone adjacent the Pangburn Road, northeastern part of Queens County, south-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 12, 2002

SITE #: Pangburn Road (B) / **F-2-02**

LOCATION:

NTS: 21 I/04 County: Queens

Geographic Description: South and adjacent the Pangburn Road, 10-11 km from its intersection with Highway # 112.

Latitude: 46° 01.823' Longitude: 65° 41.7703'

UTM Grid Zone: 20 Coordinates: 2910000 E 5100400 N

Location wrt waterways (km): □< ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: □ Open ■ Barrier/Gate
Level of Activity/Use: ■ Active □ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
□ Sandstone 100% □ Coarse-grained (0.5 - 2mm) ■ Medium-grained (0.25 - 0.5mm) □ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even □ Irregular
□ Very Very Thin (<1/2) □Even □Irregular

Dip: 15°N Strike: 280°

COLOUR: Weathered: Greyish pink Unweathered: Yellow grey

REMARKS: Black manganese oxide staining locally along bedding planes.
PHOTOS:

Site #: **F-2-02**

Ledges of very fine-grained even bedded sandstone adjacent the Pangburn Road, northeastern part of Queens County, south-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 12, 2002

SITE #: Pangburn Road (C) / **F-3-02**

LOCATION:

NTS: 21 I/04 County: Queens

Geographic Description: South and adjacent the Pangburn Road, 14-15 km from its intersection with Highway # 112.

Latitude: 46° 02.724' Longitude: 65° 39.328"

UTM Grid Zone: 20 Coordinates: 294900 E 51002500 N

Location wrt waterways (km): □ < ¼ ■ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: □ Open Field ■ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
□ Sandstone 100% □ Coarse-grained (0.5 - 2mm)
□ Medium-grained (0.25 - 0.5mm)
■ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

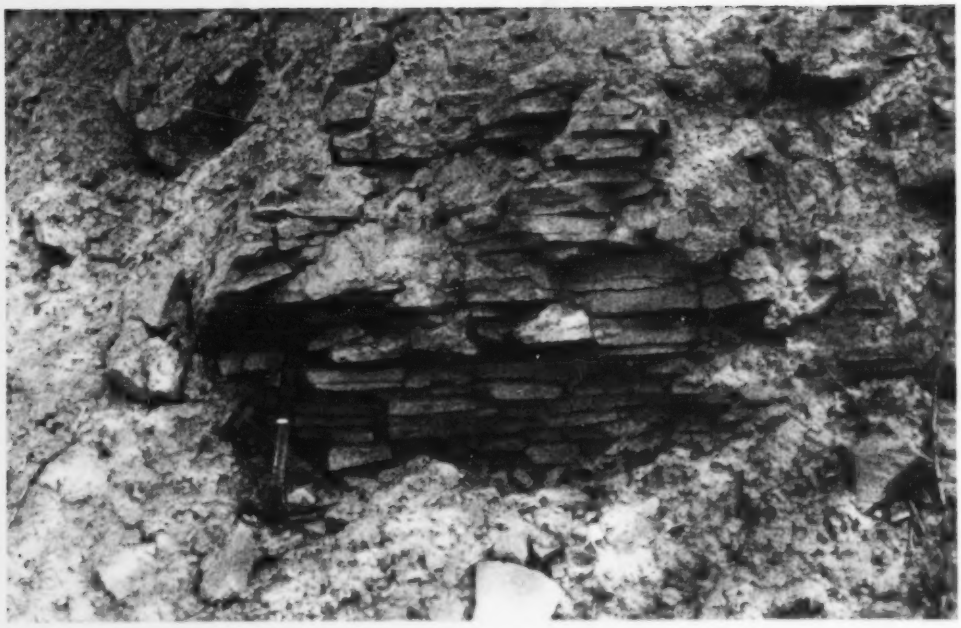
Bedding:
□ Massive (>36")
□ Thick (12"-36")
■ Thin (4"-12") □ Even □ Irregular
□ Very Thin (1/2"-2") ■ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 10S° Strike: 246°

COLOUR: Weathered: Pale red Unweathered: Light olive grey

REMARKS: 5% pebbly sandstone
PHOTOS:

Site #: **F-3-02**



Thinly bedded, fine-grained sandstone adjacent the Pangburn Road, north-eastern part of Queens County, south-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 12, 2002

SITE #: Pangburn Road (D) / **F-4-02**

LOCATION:

NTS: 21 I/04 County: Queens

Geographic Description: South and adjacent the Pangburn Road, 2-3 km south of its intersection with Cumberland Bay Road.

Latitude: 46° 00.731' Longitude: 65° 43.577

UTM Grid Zone: 20 Coordinates: 288500 E 5198500 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
□ Sandstone -%
□ Coarse-grained (0.5 - 2mm)
□ Medium-grained (0.25 - 0.5mm)
□ Fine-grained (0.125 - 0.25mm)
□ Siltstone 100-%
□ Shale -%

Bedding:

□ Massive (>36")		
□ Thick (12"-36")	□ Even	□ Irregular
□ Thin (4"-12")	□ Even	□ Irregular
■ Very Thin (1/2"-2")	■ Even	□ Irregular
□ Very Very Thin (<1/2)	□Even	□ Irregular

Dip: Horizontal Strike: N/A

COLOUR: Weathered: Unweathered: Light olive grey

REMARKS: Excavation, 1 m deep with loose very thin flaggy fine-grained sandstone to siltstone overlying solid bedrock. Appears to have reasonable potential for this evenly bedded material.

New Brunswick Crown Land Flagstone Survey

DATE: June 12, 2002

SITE #: Meadow Brook / **F-5-02**

LOCATION:

NTS: 21 I/04 County: Queens

Geographic Description: South and adjacent the Cumberland Bay Road, 3-4 km west of its intersection with the Pangburn Road.

Latitude: 46° 02.178' Longitude: 65° 44.932

UTM Grid Zone: 20 Coordinates: 286800 E 5101650 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
□ Sandstone 100% □ Coarse-grained (0.5 - 2mm)
■ Medium-grained (0.25 - 0.5mm)
■ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") □ Even □ Irregular
□ Very Very Thin (<1/2) □ Even ■ Irregular

Dip: Horizontal Strike: N/A

COLOUR: Weathered: Light grey Unweathered: Yellow grey

REMARKS: Abundant manganese staining and mud balls, Stone is quite micaceous. The surface is highly fractured and very friable.

PHOTOS:

Site #: **F-5-02**

Thinly, evenly bedded, fine-grained, manganiferous and micaceous sandstone adjacent the Cumberland Bay-Pangburn Road, northeastern part of Queens County, south-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 13, 2002

SITE #: Fire Road (A) / **F-6-02**

LOCATION:

NTS: 21 H/13 County: Queens

Geographic Description: South and adjacent the Fire Road, 13.5-4.0 km from its intersection with Highway # 10.

Latitude: 45° 54.076' Longitude: 65° 44.363

UTM Grid Zone: 20 Coordinates: 287850 E 5086500 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 □ 1-2 ■2-4 □ >4
Maximum height exposed: (m) □ <2 □ 2-4 ■ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate 10%
□ Sandstone 90% ■ Coarse-grained (0.5 - 2mm)
■ Medium-grained (0.25 - 0.5mm)
□ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
■ Thin (4"-12") ■ Even □ Irregular
□ Very Thin (1/2"-2") □ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 14°N Strike: 260°

COLOUR: Weathered: Green grey Unweathered: Light blue grey

REMARKS: Rock contains abundant plant fossil debris with ripple marks locally. Large area of outcrop with a thin cover of till.

PHOTOS:

Site #: **F-6-02**

Thin, even bedded sandstone, adjacent the Fire Tower Road, east of Coles Island, north-eastern part of Queens County, south-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 13, 2002

SITE #: Fire Road (B) / **F-7-02**

LOCATION:

NTS: 21 H/13 County: Queens

Geographic Description: South and adjacent the Fire Road, 13.5-4.0 km from its intersection with Highway # 10.

Latitude: 46° 55.167 Longitude: 65° 39.841

UTM Grid Zone: 20 Coordinates: 294350 E 5088600 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: □ Open ■ Barrier/Gate
Level of Activity/Use: □ Active □ Inactive ■ Abandoned / Reclaimed

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 □ 1-2 ■ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate 20%
□ Sandstone 80% □ Coarse-grained (0.5 - 2mm)
■ Medium-grained (0.25 - 0.5mm)
■ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
■ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
□ Very Thin (1/2"-2") □ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: N/A Strike: 280°

COLOUR: Weathered: Yellow grey Unweathered: Light olive grey

REMARKS: Very large quarry, with most material utilized in construction of the Fredericton-Moncton Highway to the north. Although excavation has been totally reclaimed there remains a lot of sandstone rubble (fieldstone).

New Brunswick Crown Land Flagstone Survey

DATE: June 13, 2002

SITE #: Fire Road (C) / **F-8-02**

LOCATION:

NTS: 21 H/13 County: Queens

Geographic Description: South (200 m) and adjacent the Fire Road, 15 km from its intersection with Highway # 10 and a few km north of Highway # 2.

Latitude: 46° 56.404' Longitude: 65° 36.312'

UTM Grid Zone: 20 Coordinates: 297500 E 5090400 N

Location wrt waterways (km): ■ < ¼ □ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: □ Quarry □ Outcrop □ Road Cut ■ Pit
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active □ Inactive ■ Abandoned/Reclaimed

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 ■ >4
Maximum height exposed: (m) □ <2 □ 2-4 □ 4-10 □ >10 ■ N/A

DEPOSIT TYPE:

Bedrock:
- □ Conglomerate 30-%
- □ Sandstone 60%
  - ■ Coarse-grained (0.5 - 2mm)
  - ■ Medium-grained (0.25 - 0.5mm)
  - ■ Fine-grained (0.125 - 0.25mm)
- □ Siltstone -%
- □ Shale 10%

Bedding:
- □ Massive (>36")
- ■ Thick (12"-36") ■ Even ■ Irregular
- □ Thin (4"-12") □ Even □ Irregular
- □ Very Thin (1/2"-2") □ Even □ Irregular
- □ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 10-15° Strike: 180°

COLOUR: Weathered: Light grey Unweathered: light olive grey

REMARKS: Extensive pit that has been abandoned and reclaimed. Several rock ledges are exposed and a limited supply of flagstone and fieldstone remains scattered about the perimeter. Several colours and textures are displayed with opportunity to develop on the west side of the pit. Very flat , evenly bedded very fine-grained, grey and mottled sandstone exposed at the east end of the former excavation.

PHOTOS:

Site #: **F-8-02**

Ledges of thin to thick, even bedded sandstone, a few kilometres north of Highway # 2 and east of the Fire Tower Road at a former quarry site, northeastern Queens County, south-central New Brunswick

Site # **F-8-02**: Very flat, thin- to thick-bedded, grey, fine-grained sandstone a few kilometres north of Highway # 2 and east of the Fire Tower Road at a former quarry site, northeastern Queens County, south-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 13, 2002

SITE #: Fire Road (D) / **F-9-02**

LOCATION:

NTS: 21 H/13 County: Queens

Geographic Description: South and adjacent the Fire Road, 18-19 km from its intersection with Highway # 10 and a few km north of Highway # 2, near Miller Brook.

Latitude: 46° 58.000' Longitude: 65° 35.421'

UTM Grid Zone: 20 Coordinates: 298500 E 5093150 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ ■ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: □ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: □ Open Field ■ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
□ Sandstone 100% □ Coarse-grained (0.5 - 2mm)
■ Medium-grained (0.25 - 0.5mm)
□ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
■ Thin (4"-12") □ Even □ Irregular
□ Very Thin (1/2"-2") □ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 8° E Strike: 180°

COLOUR: Weathered: Brown grey Unweathered: Olive grey

REMARKS: Adjacent to road, near a tree plantation.

PHOTOS:

Site #: **F-9-02**

Thin bedded, medium-grained sandstone adjacent the fire Tower Road, northeastern Queens County, south-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 20, 2002

SITE / #: Bronson Settlement Road / **F-10-02**

LOCATION:

NTS: 21 I/04 County: Queens

Geographic Description: North (50 m) and adjacent the Bronson Settlement Road, 5-6-10 km east of Bronson Settlement.

Latitude: 46° 14.595' Longitude: 65° 42.850'

UTM Grid Zone: 20 Coordinates: 293400 E 5124150 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 □ 2-4 □■ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
□ Sandstone 100% □ Coarse-grained (0.5 - 2mm)
■ Medium-grained (0.25 - 0.5mm)
□ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 10° E Strike: 180°

COLOUR: Weathered: Pale yellow brown Unweathered: Greenish grey

REMARKS: Potential for very large massive boulders.
PHOTOS:

Site #: **F-10-02**

Thin to thick bedded sandstone near Bronson Settlement,
Queens County, South-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 20, 2002

SITE / #: Trout Brook Lake (east) / **F-11-02**

LOCATION:

NTS: 21 I/05 County: Kent

Geographic Description: Adjacent the Salmon River Road, 16 km north of its intersection with Highway # 116, 3km east of Castaway.

Latitude: 46° 25.253' Longitude: 65° 40.195'

UTM Grid Zone: 20 Coordinates: 294650 E 5143950 N

Location wrt waterways (km): ■ < ¼ □ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
□ Sandstone 100%
  □ Coarse-grained (0.5 - 2mm)
  ■ Medium-grained (0.25 - 0.5mm)
  □ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even □ Irregular
□ Very Very Thin (<1/2) ■ Even ■ Irregular

Dip: 5° E Strike: 320°

COLOUR: Weathered: Light olive grey Unweathered: greenish grey

REMARKS: Cross-bedded, micaceous sandstone with minor concentrations of marcasite. A good mix of thinly bedded and massive material appears to be available.

PHOTOS:

Site #: **F-11-02**

Thin, even to lenticular cross bedded sandstone, northeast of Castaway, adjacent the Salmon River Road, western half of Kings County, east-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 12, 2002

SITE / #: Trout Brook / **F-12-02**

LOCATION:

NTS: 21 I/06 County: Kent

Geographic Description: Adjacent the Salmon River Road, 4-5 km north of its intersection with Highway # 116, 11-12 km west Highways # 116 -126 intersection at Mortimer.

Latitude: 46° 27.778' Longitude: 65° 25.266'

UTM Grid Zone: 20 Coordinates: 314100 E 5148100 N

Location wrt waterways (km): ■ < ¼ □ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
- ■ Conglomerate 30-%
- ■ Sandstone 70%
  - ■ Coarse-grained (0.5 - 2mm)
  - ■ Medium-grained (0.25 - 0.5mm)
  - □ Fine-grained (0.125 - 0.25mm)
- □ Siltstone -%
- □ Shale -%

Bedding:

□ Massive (>36")		
□ Thick (12"-36")	□ Even	□ Irregular
■ Thin (4"-12")	□ Even	□ Irregular
■ Very Thin (1/2"-2")	■ Even	■ Irregular
□ Very Very Thin (<1/2)	□ Even	□ Irregular

Dip: 10° E Strike: 290°

COLOUR: Weathered: Greyish red Unweathered: Light grey

REMARKS: N/A

PHOTOS:

Site #: **F-12-02**

Thinly, evenly to irregularly bedded, medium-grained sandstone, adjacent the Salmon River Road, 14 km west of Harcourt, Kent County, east-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 24, 2002

SITE / : Blind Brook (A) / **F-13-02**

LOCATION:

NTS: 21 I/06 County: Kent

Geographic Description: Adjacent Highway 465, 1 km west of Blind Brook and 3 km north of Clairville.

Latitude: 46° 24.523' Longitude: 65° 04.723'

UTM Grid Zone: 20 Coordinates: 340150 E 5141450 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
■ Sandstone 100% □ Coarse-grained (0.5 - 2mm) ■ Medium-grained (0.25 - 0.5mm) □ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 5° E Strike: 180°

COLOUR: Weathered: Light brownish grey Unweathered: Light olive grey

REMARKS: N/A.
PHOTOS:

Site #: **F-13-02**

Very thin bedded, medium grained sandstone, 3 to 4 kilometres south of Beersville, Kent County, east-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 12, 2002

SITE / #: Blind Brook (B) / **F-14-02**

LOCATION:

NTS: 21 I/06 County: Kent

Geographic Description: Adjacent Highway 465, 1.5 km west of Blind Brook and 3 km north of Clairville.

Latitude: 46° 01.842' Longitude: 65° 41.763

UTM Grid Zone: 20 Coordinates: 340000 E 5141350 N

Location wrt waterways (km): ■ < ¼ □ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: ■ Active □ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
■ Sandstone 100% ■ Coarse-grained (0.5 - 2mm)
□ Medium-grained (0.25 - 0.5mm)
□ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

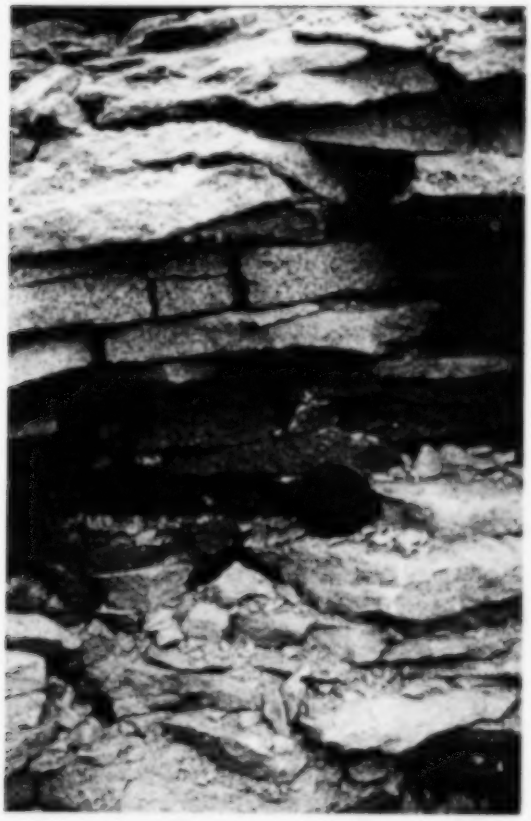
Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even ■ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: Flat lying Strike: N/A

COLOUR: Weathered: Pale yellow brown Unweathered: Light olive grey

REMARKS: Stone is very friable and locally manganiferous.
PHOTOS:

Site #: **F-14-02**



Very thin, even to irregular bedded, medium-grained sandstone, 3 to 4 kilometres south of Beersville, Kent County, east-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 24, 2002

SITE / # : Terrains de L'Eyêque (east) / **F-15-02**

LOCATION:

NTS: 21 I/06 County: Kings

Geographic Description: Adjacent and north of Highway 485, near the Buctouche River at Terrains de L'Eyêque.

Latitude: 46° 16.764' Longitude: 65° 01.980'

UTM Grid Zone: 20 Coordinates: 343350 E 5126750 N

Location wrt waterways (km): ■ < ¼ □ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: ■ Active □ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 □ 1-2 ■ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
- ■ Conglomerate 5%
- ■ Sandstone 95%
  - ■ Coarse-grained (0.5 - 2mm)
  - □ Medium-grained (0.25 - 0.5mm)
  - □ Fine-grained (0.125 - 0.25mm)
- □ Siltstone -%
- □ Shale -%

Bedding:
- □ Massive (>36")
- □ Thick (12"-36") □ Even □ Irregular
- □ Thin (4"-12") □ Even □ Irregular
- ■ Very Thin (1/2"-2") ■ Even □ Irregular
- □ Very Very Thin (<1/2) □ Even □ Irregular

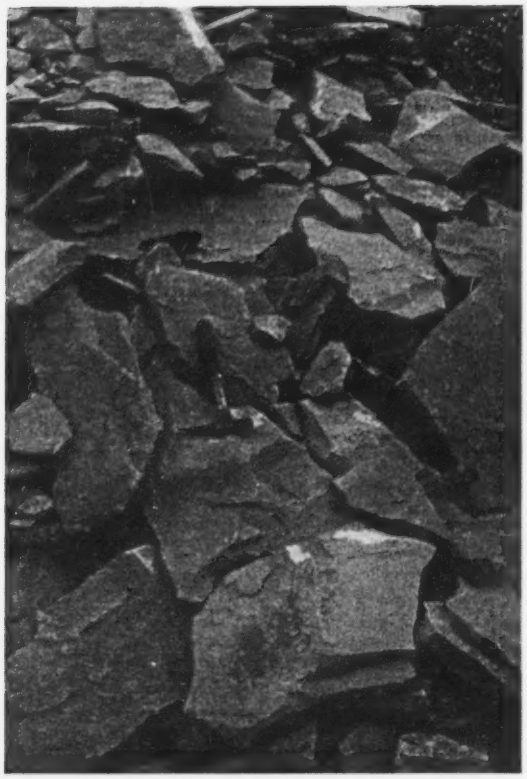
Dip: < 10° Strike: N/A

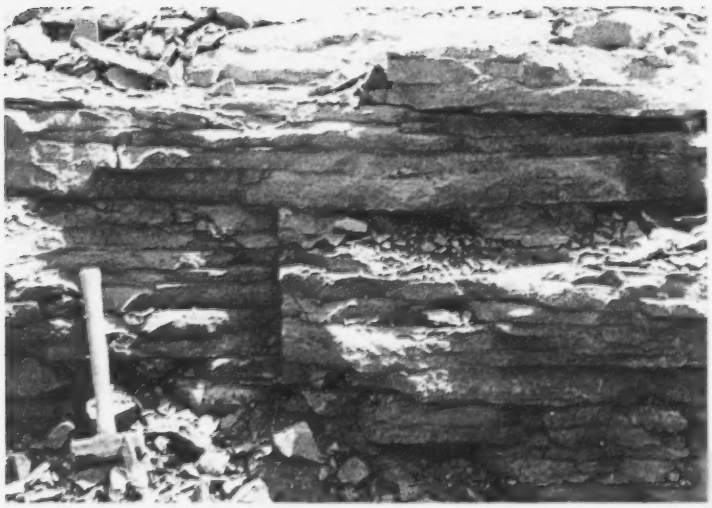
COLOUR: Weathered: Light brownish grey and light olive grey
Unweathered: Light olive grey

REMARKS: Potential for large "chunky" pieces of fieldstone here.

PHOTOS:

Site #: **F-15-02**





Thin to very thin, irregular to even bedded, medium to coarse-grained sandstone near Terrains de L'Eyêque, Kent County, east-central New Brunswick

Site **F-15-02**: Thin to very thin, irregular to even bedded, medium to coarse-grained sandstone near Terrains de L'Eyêque, Kent County, east-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 25, 2002

SITE / #: Pleasant Brook / **F-16-02**

LOCATION:

NTS: 21 I/05 County: Sunbury

Geographic Description: Adjacent Highway 123, 1,5 km north of Queens/Sunbury County line and 5-6 km north of Upper Gaspereau.

Latitude: 46° 19.416' Longitude: 65° 52.510'

UTM Grid Zone: 20 Coordinates: 278500 E 5134000 N

Location wrt waterways (km): ■ < ¼ □ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: ■ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 □ 2-4 ■ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
- ■ Conglomerate 15%
- ■ Sandstone 85%
  - ■ Coarse-grained (0.5 - 2mm)
  - □ Medium-grained (0.25 - 0.5mm)
  - □ Fine-grained (0.125 - 0.25mm)
- □ Siltstone -%
- □ Shale -%

Bedding:

□ Massive (>36")		
■ Thick (12"-36")	□ Even	■ Irregular
□ Thin (4"-12")	□ Even	□ Irregular
□Very Thin (1/2"-2")	□Even	□ Irregular
□ Very Very Thin (<1/2)	□ Even	□ Irregular

Dip: N/A Strike: N/A

COLOUR: Weathered: Greyish orange Unweathered: Yellow grey

REMARKS: Locally fossiliferous.

New Brunswick Crown Land Flagstone Survey

DATE: June 25, 2002

SITE / #: Gaspereau River-McAllister Brook / **F-17-02**

LOCATION:

NTS: 21 I/05 County: Northumberland

Geographic Description: Situated adjacent a logging road, approximately 400 m west of its intersection with Highway # 123 and 3 km north of the Northumberland-Sunbury County line.

Latitude: 46° 21.788' Longitude: 65° 56.494'

UTM Grid Zone: 20 Coordinates: 273750 E 5138500 N

Location wrt waterways (km): ■ < ¼ □■ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: □ Open Field ■ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
- ■ Conglomerate -%
- ■ Sandstone 100%
  - ■ Coarse-grained (0.5 - 2mm)
  - □ Medium-grained (0.25 - 0.5mm)
  - □ Fine-grained (0.125 - 0.25mm)
- □ Siltstone -%
- □ Shale -%

Bedding:
- □ Massive (>36")
- □ Thick (12"-36") □ Even □ Irregular
- □ Thin (4"-12") □ Even □ Irregular
- ■ Very Thin (1/2"-2") ■ Even □ Irregular
- □ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 5° S Strike: 070°

COLOUR: Weathered: Pale yellow orange Unweathered: Light olive grey

REMARKS: N/A

PHOTOS:

Site #: **F-17-02**

Very thin to thin, even to irregular bedded, coarse-grained sandstone, 10 km north of Upper Gaspereau, near the Gaspereau River, Northumberland County, central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 25, 2002

SITE / #: Ten Mile Brook / **F-18-02**

LOCATION:

NTS: 21 I/05 County: Northumberland

Geographic Description: Adjacent the Acadia Road, 1 km northeast of its intersection with Highway # 123.

Latitude: 46° 24.881' Longitude: 65° 59.412'□

UTM Grid Zone: 20 Coordinates: 270700 E 5144350 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ ■ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: □ Open Field ■ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
- □ Conglomerate -%
- ■ Sandstone 100%
  - ■ Coarse-grained (0.5 - 2mm)
  - □ Medium-grained (0.25 - 0.5mm)
  - □ Fine-grained (0.125 - 0.25mm)
- □ Siltstone -%
- □ Shale -%

Bedding:

□ Massive (>36")		
□ Thick (12"-36")	□ Even	□ Irregular
■ Thin (4"-12")	■ Even	■ Irregular
□ Very Thin (1/2"-2")	□ Even	□ Irregular
□ Very Very Thin (<1/2)	□ Even	□ Irregular

Dip: 8° E Strike: 320°

COLOUR: Weathered: Yellowish grey Unweathered: Light olive grey

REMARKS: Massive, thick cross-bedded stone.

PHOTOS:

Site #: **F-18-02**

Thin, even to irregular bedded, coarse-grained sandstone near the intersection of the Acadia Road and Highway # 123, 18 km north of Upper Gaspereau, Northumberland County, central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 25, 2002

SITE / #: MacKenzie Brook - Cains River / **F-19-02**

LOCATION:

NTS: 21 J/08 County: Northumberland

Geographic Description: Situated 15 km south of Doaktown and 1.5 km east of Highway # 123.

Latitude: 46° 27.420' Longitude: 66° 00.895'

UTM Grid Zone: 19 Coordinates: 290900 E 5100500 N

Location wrt waterways: (km) □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: ■ Active □ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 ■ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
■ Sandstone 100% □ Coarse-grained (0.5 - 2mm)
■ Medium-grained (0.25 - 0.5mm)
■ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even □ Irregular
□ Very Very Thin (<1/2) ■ Even ■ Irregular

Dip: 0° Strike: N/A

COLOUR: Weathered: Green grey Unweathered: Light olive grey

REMARKS: Very flat, planar stone with large slabs available locally. Average thickness of 5 cm.

PHOTOS:

Site #: **F-19-02**

Very thin to thin, even bedded, medium- to fine-grained sandstone, 15 km southwest of Doaktown, Northumberland County, central New Brunswick

Site # **F-19-02**: Very thin to thin, even bedded, medium- to fine-grained sandstone, 15 km southwest of Doaktown, Northumberland County, central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: June 28, 2002

SITE / #: Big Hollow Brook / **F-20-02**

LOCATION:

NTS: 21 J/08 County: York

Geographic Description: Situated about 5 km west of Burnt Land Brook Lake, 5-10 km south of Boiestown via the Bantalor Road.

Latitude: 46° 24.129' Longitude: 66° 24.511'

UTM Grid Zone: 19 Coordinates: 699150 E 5141350 N

Location wrt waterways: (km) ■ < ¼ □ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: ■ Active □ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:

□ Conglomerate -%
■ Sandstone 100% □ Coarse-grained (0.5 - 2mm) □ Medium-grained (0.25 - 0.5mm) ■ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:

□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 5° N Strike: 110°

COLOUR: Weathered: Brown grey Unweathered: Green grey

REMARKS: Very flat, planar, thinly bedded stone that may thicken with depth. Some flagstone was being excavated from this site in 2002 and marketed for landscape purposes. No record of activity in 2003 or 2004

PHOTOS:

Site #: **F-20-02**

Very thin, even bedded medium-grained sandstone, 7.5 km south of Boiestown, York County, central New Brunswick

Site # **F-20-02**: Very thin, even bedded medium-grained sandstone, 7.5 km south of Boiestown, York County, central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: July 03, 2002

SITE / #: East Branch Six Mile Brook / **F-21-02**

LOCATION:

NTS: 21 I/05 County: Northumberland

Geographic Description: Adjacent the Acadia Road, 20 km northeast of its intersection with Highway # 123.

Latitude: 46° 29 .935' Longitude: 65° 47.204'

UTM Grid Zone: 20 Coordinates: 286100 E 5153050 N

Location wrt waterways (km): ■ < ¼ □ ¼ – ½ □■ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
■ Sandstone 100% □ Coarse-grained (0.5 - 2mm) ■ Medium-grained (0.25 - 0.5mm) □ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
■ Thin (4"-12") □ Even ■ Irregular
□ Very Thin (1/2"-2") □ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 5° E Strike: 020°

COLOUR: Weathered: Light olive grey Unweathered: Greenish grey

REMARKS: limited exposure situated under power transmission line.

New Brunswick Crown Land Flagstone Survey

DATE: July 04, 2002

SITE / #: West Branch Sabbies River (A) / **F-22-02**

LOCATION:

NTS: 21 I/12 County: Northumberland

Geographic Description: Adjacent the Fraser Road, 1 km north of its intersection with the Acadia Road and 1 km west of the West Branch Sabbies River.

Latitude: 46° 31.266' Longitude: 65° 45.256'

UTM Grid Zone: 20 Coordinates: 288850 E 5156050 N

Location wrt waterways: (km) □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active □■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
■ Sandstone 100% □ Coarse-grained (0.5 - 2mm)
□ Medium-grained (0.25 - 0.5mm)
■ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even ■ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: N/A Strike: N/A

COLOUR: Weathered: Light brownish grey Unweathered: Light grey

REMARKS: Thick cross beds (1.5 m).

New Brunswick Crown Land Flagstone Survey

DATE: **June 03, 2002**

SITE / #: West Branch Sabbies River (B) / **F-23-02**

LOCATION:

NTS: 21 I/12 County: Northumberland

Geographic Description: Adjacent the Acadia Road, 25 km northeast of its intersection with Highway # 123.

Latitude: 46° 31.078' Longitude: 65° 44.618'

UTM Grid Zone: 20 Coordinates: 289450 E 5155000 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: □ Open Field ■ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
■ Sandstone 100% □ Coarse-grained (0.5 - 2mm)
□ Medium-grained (0.25 - 0.5mm)
■ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") □ Even ■ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 5° N Strike: 240°

COLOUR: Weathered: Light olive grey Unweathered: Yellow grey

REMARKS: Marcasite mineralization locally.
PHOTOS:

Site #: **F-23-02**

Very thin to thin bedded, fine- to medium-grained sandstone near the intersection of the West Branch Sabbies River and Acadia Road, Northumberland County, central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: July 08 2002

SITE / #: Acadieville (south) / **F-24-02**

LOCATION:

NTS: 21 I/11 County: Kent

Geographic Description: Situated 3 km south of Acadieville, near the Kouchibouquac River.

Latitude: 46° 43.066' Longitude: 65° 14.773'

UTM Grid Zone: 20 Coordinates: 3128150 E 5176250 N

Location wrt waterways: (km) ■ < ¼ □ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: ■ Active □ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
□■ Sandstone 100% ■ Coarse-grained (0.5 - 2mm)
■ Medium-grained (0.25 - 0.5mm)
□ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even ■ Irregular
□ Very Very Thin (<1/2) ■ Even ■ Irregular

Dip: N/A Strike: N/A

COLOUR: Weathered: Light brownish grey Unweathered: Light olive grey

REMARKS: N/A

PHOTOS:

Site #: **F-24-02**

Very thin, even to irregular bedded, coarse- to medium-grained sandstone, 2 km south of Acadieville, Northumberland County, east-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: July 08, 2002

SITE / #: Desherbiers (west) / **F-25-02**

LOCATION:

NTS: 21 I/11 County: Kent

Geographic Description: Situated 1 km west of Desherbiers.

Latitude: 46° 39.053' Longitude: 65° 15.047'

UTM Grid Zone: 20 Coordinates: 327900 E 5168500 N

Location wrt waterways: (km) □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active □■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
■ Sandstone 100% □ Coarse-grained (0.5 - 2mm)
□ Medium-grained (0.25 - 0.5mm)
□■ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□■ Thin (4"-12") □ Even ■ Irregular
□ Very Thin (1/2"-2") □ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: N/A Strike: N/A

COLOUR: Weathered: Light brown grey Unweathered: Light grey

REMARKS: Exposed stone is quite soft.

New Brunswick Crown Land Flagstone Survey

DATE: July 10 2002

SITE / #: Dungarvon Lake (west) / **F-26-02**

LOCATION:

NTS: 21 J/09 County: Northumberland

Geographic Description: Adjacent the Dungarvon Lake Road, 2.5-3.0 km east of its intersection with the Dungarvon River Road.

Latitude: 46° 39.373' Longitude: 66° 17.553'

UTM Grid Zone: 20 Coordinates: 707150 E 5170250 N

Location wrt waterways: (km) □ < ¼ ■ ¼ – ½ □ ½ – 1 ½ □ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: ■ Active □ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) □ <1 ■ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 ■ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
■ Sandstone 100% □ Coarse-grained (0.5 - 2mm) ■ Medium-grained (0.25 - 0.5mm) □ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
□ Thin (4"-12") □ Even □ Irregular
■ Very Thin (1/2"-2") ■ Even □ Irregular
□ Very Very Thin (<1/2) □ Even □ Irregular

Dip: 2° S Strike: 085°

COLOUR: Weathered: light olive grey Unweathered: Light olive grey

REMARKS: Stone dipping into hillside with good opportunity for extraction.

PHOTOS:

Site #: **F-26-02**

Very thin, even bedded, medium-grained sandstone, 16 km northwest of Doaktown, Northumberland County, north-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: July 10 2002

SITE / 3: Big Hole Brook (south) / **F-27-02**

LOCATION:

NTS: 21 J/09 County: Northumberland

Geographic Description: Situated 3 km west Crooked Ridge Brook and the Dungarvon River Road

Latitude: 46° 34.269' Longitude: 66° 21.674

UTM Grid Zone: 20 Coordinates: 7002200 E 5160700 N

Location wrt waterways (km): □ < ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■ <1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) □ <2 □ 2-4 □■ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
□ Conglomerate -%
■ Sandstone 100% □ Coarse-grained (0.5 - 2mm)
□ Medium-grained (0.25 - 0.5mm)
■ Fine-grained (0.125 - 0.25mm)
□ Siltstone -%
□ Shale -%

Bedding:
□ Massive (>36")
□ Thick (12"-36") □ Even □ Irregular
■ Thin (4"-12") ■ Even ■Irregular
□Very Thin (1/2"-2") □ Even □ Irregular
□ Very Very Thin (<1/2) □Even □ Irregular

Dip: N/A Strike: N/A

COLOUR: Weathered: Light blue grey Unweathered: Light olive grey

REMARKS: site has been reclaimed.
PHOTOS:

Site #: **F-27-02**

Thin, even to irregular, medium-grained sandstone, 18 km west of Doaktown, Northumberland County, north-central New Brunswick

New Brunswick Crown Land Flagstone Survey

DATE: July 10, 2002

SITE/ # : Coal Creek (north) / **F-28-02**

LOCATION:

NTS: 21 I/04 County: Queens

Geographic Description: situated 2 km north of Coal Creek and 200 m east of Highway # 10.

Latitude: 46° 07.272' Longitude: 65° 53.132'

UTM Grid Zone: 20 Coordinates: 276400 E 5111150 N

Location wrt waterways (km): □< ¼ □ ¼ – ½ □ ½ – 1 ½ ■ >1½

EXPOSURE:

Exposure Type: ■ Quarry □ Outcrop □ Road Cut □ Other
Access: ■ Open □ Barrier/Gate
Level of Activity/Use: □ Active ■ Inactive □ Abandoned/Depleted

SITE DESCRIPTION:

Vegetation: ■ Open Field □ Lightly Forested □ Heavily Forested
Development: (worked area in ha) ■<1 □ 1-2 □ 2-4 □ >4
Maximum height exposed: (m) ■ <2 □ 2-4 □ 4-10 □ >10

DEPOSIT TYPE:

Bedrock:
- ■ Conglomerate 90%
- ■ Sandstone 10%
  - ■ Coarse-grained (0.5 - 2mm)
  - □ Medium-grained (0.25 - 0.5mm)
  - □ Fine-grained (0.125 - 0.25mm)
- □ Siltstone -%
- □ Shale -%

Bedding:

□ Massive (>36")		
□ Thick (12"-36")	□ Even	□ Irregular
□ Thin (4"-12")	□ Even	□ Irregular
■ Very Thin (1/2"-2")	□ Even	■ Irregular
■ Very Very Thin (<1/2)	□ Even	■ Irregular

Dip: 10° E Strike: 330°

COLOUR: Weathered: Brownish grey Unweathered: Light brown grey

REMARKS: N/A
PHOTOS:

Site #: **F-28-02**

Thin to very thin, irregular bedded, coarse-grained to pebbly sandstone, 6 km south of Chipman, Queens County, south-central New Brunswick

APPENDIX B: ACQUISITION OF PIT AND QUARRY RIGHTS ON CROWN LANDS IN NEW BRUNSWICK

ACQUISITION OF PIT AND QUARRY RIGHTS ON CROWN LANDS IN NEW BRUNSWICK[1]

In New Brunswick the Minister of Natural Resources controls the extraction of all quarriable substances[2] (i.e., granular and bedrock aggregate and peat) on Crown lands and that area of the shoreline that lies within 300 m above and 300 m below the ordinary high water mark through the Quarriable Substances Act and Regulation 93-92.

There are three regulated procedures by which Crown land aggregate materials may acquire in New Brunswick: A) Written Authorization, B) Quarry Permit and C) Quarry Lease

A) Written Authorization refers to extraction from existing pits or quarries for tonnages less than 1000 tonnes for a period of not exceeding 30 days.

1. Application is made at the District Ranger Office. There is a $10.00 application fee [as per Regulation 93-92 (2003)].
2. If approved, the District Ranger can issue authorization on the same day. The applicant is required to pay a non-refundable royalty payment [calculated at 25 cents/tonne as per regulation 93-92 (2003)] on the total amount of material required (< 1000 tonnes) at the time of issue.
3. The applicant has (30 days) from the date authorization to extract the required material. At the end of that time authorization expires. If the material has not been extracted during this period, the applicant will be required to re-apply (note: royalty payments are not refundable).

B) Quarry Permit addresses extraction from new or existing pits or quarries for a period ending December 31st of the same year issue.

1. Application is made at the local District Ranger Office. There is a $10.00 application fee [as per Regulation 93-92 (2003)].
2. Application is reviewed by the District Ranger, and officials at the Regional Office and the Department's Mines Branch, a process that takes about two weeks.
3. On approved the quarry permit is valid for the time specified but in no case shall it exceed the thirty-first day of December of the year for which it is issued.
4. The permittee is required to submit the following before the 20th day of July and the 20th day of January:

    - a royalty return form stating quantities of quarriable substances removed; and

[1] This is a brief summary of acquisition procedures for Crown land aggregate resources. For details refer to the Quarriable Substances Act (1991)and Regulation 93-92 (1993).
[2] A quarriable substance is defined as "ordinary stone, building or construction stone, sand, gravel, peat, clay and soil" (Quarriable Substances Act (1991), p. 4)

- a royalty payment [calculated at 25 cents/tonne as per regulation 93-92 (2003)], to be paid to the Financial Services Branch of Department of Natural Resources
-

Depending on circumstances various conditions may be established in the authorization and permit that address general development, operational and reclamation concerns of the subject pit or quarry site.

Development conditions

1. No material is to be removed from within 60 m of any watercourse.
2. No material is to be removed from below the water table.
3. All merchantable timber must be harvested before any material is removed. Proper permits must be in place before harvesting operations are initiated.
4. Any overburden removed during stripping operations must be stored at a site approved by the District Ranger to be utilized for reclamation initiatives (i.e., re-vegetation) following the completion of the extractive phase of operations (i.e., the permittee is required to redistribute overburden over the excavated area once operations are complete, if the District Ranger deems it necessary).

Operational conditions

1. Should any water be withdrawn from nearby watercourses for the operation of pits or quarries, or should any water be discharged from a pit or quarry operation, appropriate approvals (i.e., Watercourse Alteration Permit) is required from the Department of Environment and Local Government.
2. Any stream crossing or alteration associated with pit and quarry operations will require appropriate approval (i.e., Watercourse Alteration Permit) from the Department of Environment and Local Government.
3. If an operator plans on conducting any kind of processing facility in conjunction with pit and quarry operations (i.e., asphalt, cement, etc), they may require a Certificate of Approval to Operate issued by the Department of Environment and Local Government.
4. Operators should be aware that the Workplace, Health and Safety Compensation Commission have regulations addressing the safe operation of equipment in a pit or quarry.

Reclamation

All permit holders are required to rehabilitate the area they have worked, within a Crown land pit or quarry. In general, the permit holder is required to take appropriate steps to ensure the safety of the public and protection of the environment. This includes but is not limited to sloping or placing safety berms around perimeters of worked faces and the proper contouring pit/quarry floors to limit excessive ponding of water within the

excavated area. As well, there may be conditions added to the authorization or permit specifying certain requirements such as re-seeding, reforestation and others for the worked area.

C) A Quarry Lease is a third procedure available to acquire the rights to Crown land quarriable substances. It differs from the authorization and permitting process in that a lease will provide a company exclusive rights to specified resource area and/or sole use of a pit or quarry located on Crown land. The term of the lease can vary up to a maximum term of ten years. To secure a quarry lease the company must be able to demonstrate the need for exclusive use (i.e., to secure their investment in equipment, etc.)

The quarry lease application and approval process generally requires a minimum of 6 months to complete and includes the following steps:

1. Application is made at the local District Ranger Office. There is a $50.00 application fee [as per Regulation 93-92 (2003)].
2. The application is forwarded to the Department's Mines Branch Fredericton headquarters through the Regional Office.
3. As part of a comprehensive review process the applicant is requested to submit additional details pertaining to the development and reclamation of the proposed pit or quarry site. This information generally includes but is not limited to the following[3]:

   Location plan with:

   a) A map (1:12 500 scale or greater detail) showing:
   b)

   - topographic features;
   - natural watercourses;
   - public roads and highways;
   - any surrounding or neighbouring land uses, etc., within 1000 m of the proposed pit or quarry site

   c) A map showing the proposed lease boundaries, including the size of the lease area (hectares).

   d) Site plan showing the following:

   - entrances and exits to and from the site;
   - location of any fences, gates or barriers;
   - location of all facilities associated with further processing, waste water treatment or control of surface water;

[3] The Minister of Natural Resources reserves the authority to attach any special conditions to any proposed Crown land pit/quarry authorization, permit or lease.

- production stockpile location(s), waste piles, settling ponds; and
- location of all permanent or temporary structures on the site

Development plan with:

- estimated annual production;
- estimated employment potential;
- proposed extraction method (s);
- provisions for safety;
- planned sequence and direction of pit development;
- estimated investment in equipment to be utilized including that associated with drilling, blasting, loading, hauling and sizing; and
- a list of commodities (i.e., products) to be produced

Operating plan with:

- annual operating schedule, including daily hours of operation;
- haulage routes to be used to transport product to customers;
- a description of the source, quantity and use of water in the extraction or beneficiation process (i.e., wash plant, etc.)

Environmental Protection plan with:

- a description of the method (s) used to collect, store, and dispose of lubricants;
- a list of chemicals to be used on site; and
- a description of the quantity, quality, and mitigative processes proposed treat any effluent being discharged into the surrounding environment

Reclamation plan with:

- a detailed description and schedule of the planned procedures for the protection, reclamation, and rehabilitation of the site, including where applicable details pertaining to: backfilling, contouring, benching, sloping, grading, fencing, screening, construction of berms, and re-vegetation;
- a plan for ongoing reclamation; and
- an estimated cost of the reclamation program

4. Information is reviewed by various regulatory agencies. Comments are coordinated and reviewed by the Mines Branch officials when considering the application.
5. On approval, the lease applicant is required to proceed with a legal survey of the proposed site and submit an appropriate survey plan. The applicant is required to pay a first year land rental fee [i.e., calculated at $50.00 per hectare, as per regulation 93-92 (2003)],) and submit a reclamation security [$20.00 per hectare or $5000.00, whichever

is greater, as per regulation 93-92 (2003)]. Once all requirements are completed the lease documents are prepared for signature by the lessee and the Minister.

6. Similar to the permitting process the holder of the lease is required to submit before the 20th day of July and the 20th day of January:

    - a royalty return form stating quantities of quarriable substances removed; and a royalty payment [calculated at 25 cents/tonne as per regulation 93-92 (2003)], to be paid to the Financial Services Branch of Department of Natural Resources

Potential Resources of Flagstone from Selected Crown Lands in Central and East-Central New Brunswick

Plate 2004-3

Site # F-#-02	Deposit Name	Latitude	Longitude	County	NTS 21/
1	Pargburr Road (A)	46°01.842	65°41.783	Queens	I/04
2	Pargburr Road (B)	46°01.823	65°41.770	Queens	I/04
3	Pargburr Road (C)	46°02.724	65°39.328	Queens	I/04
4	Pargburr Road (D)	46°00.731	65°43.577	Queens	I/04
5	Meerine Brook	46°02.178	66°44.832	Queens	I/04
6	Fire Tower Road (A)	45°54.076	66°44.383	Queens	H/13
7	Fire Tower Road (B)	45°55.167	65°39.841	Queens	H/13
8	Fire Tower Road (C)	45°56.404	65°38.312	Queens	H/13
9	Fire Tower Road (D)	45°56.000	65°39.421	Queens	H/13
10	Brennan Settlement Road	45°14.585	65°42.850	Queens	I/04
11	Trout Brook Lake (east)	46°25.253	65°40.185	Kent	I/05
12	Trout Brook	46°27.778	65°25.226	Kent	I/06
13	Blind Brook (A)	46°24.523	66°04.723	Kent	I/06
14	Blind Brook (B)	46°01.842	65°04.783	Kent	I/06
15	Terrains de l'Evêque (east)	46°16.784	65°01.980	Kent	I/06
16	Pleasant Brook	46°19.417	65°52.510	Sunbury	I/05
17	Gaspereau River McAlister Brook	46°21.788	65°38.494	Northumberland	I/05
18	Ter Mite Brook	46°24.881	65°59.412	Northumberland	I/05
19	McKenzie Brook Cains River	46°27.420	66°00.895	Northumberland	J/08
20	Big Hollow Brook	46°24.129	66°24.511	York	J/08
21	East Branch Six Mile Brook	46°29.935	65°47.204	Northumberland	I/05
22	West Branch Salmon River (A)	46°31.288	65°45.258	Northumberland	I/12
23	West Branch Salmon River (B)	46°31.078	65°44.618	Northumberland	I/12
24	Acadieville (south)	46°43.086	65°14.773	Kent	I/11
25	Dieppedam (west)	46°39.053	65°15.047	Kent	I/11
26	Dungarvon Lake (west)	46°39.373	66°17.553	Northumberland	J/09
27	Big Nose Brook (south)	46°34.269	66°21.874	Northumberland	J/09
28	Coal Creek (north)	46°07.272	65°53.132	Queens	I/04

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